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Speech adaptation to a self-inflicted cosmetic tongue split: Perceptual and ultrasonographic analysis

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Abstract

In the cosmetic tongue split operation, the anterior tongue blade is split along the midline of the tongue. The goal of this case study was to obtain preliminary data on speech and tongue motility in a participant who had performed this operation on himself. The participant underwent an articulation test and a tongue motility assessment, as well as an ultrasound examination. Tongue motility was mildly reduced as a result of tissue scarring. Speech was rated to be highly intelligible and acceptable by 4 raters, although 2 raters noticed slight distortions of the sibilants /s/ and /z/. The 3-dimensional ultrasound demonstrated that the synergy of the 2 sides of the tongue was preserved and that the patient compensated for the tongue split with increased medio-lateral compression of the two sides of the tongue. It is concluded that the tongue split procedure did not significantly affect the participant's speech intelligibility and tongue motility.

Keywords: *Tongue split, tongue piercing, speech, tongue motility, ultrasound*

Introduction

For the last two decades, so-called ''body modifications'' have become increasingly popular in Western societies. Cosmetic body modifications include piercing of the tongue, lips, face and genitals, deliberate scarring, ''branding'' with hot irons and the subcutaneous implantation of metal studs. These operations are usually performed by medically untrained body artists. Neither they nor their clients regard body modifications as very invasive or dangerous. However, there is a rapidly growing body of medical evidence that tongue piercings may lead to tooth fractures (Botchway & Kuc, 1998; De Moor, De Witte, & De Bruyne, 1998; Bassiouny, Deem, & Deem, 2001), gingival recession (Er, Ozkavaf, Berberoglu, & Yamalik, 2000; Kretchmer & Moriarty, 2001), severe wound inflammation (Dyce et al., 2000, Keogh & O'Leary, 2001) or allergic reactions (Smith, Wang, & Sidal, 2002). Descriptions of speech difficulties associated with tongue piercings have been mostly anecdotal (Farah & Harmon, 1998).

The cosmetic tongue split (also known as forked tongue or snake tongue) is a more extreme body modification. There is only one anecdotal description of a person with a

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tongue split in the medical literature to date (Benecke, 1999). In this procedure, the anterior blade of the tongue is severed along the midline of the tongue from the tip to the superior attachment of the sublingual frenulum. There are two different ways to achieve this tongue split. One way is to have the procedure done by a dental surgeon or a body artist who uses a surgical scalpel to make the incision. The wound must be cauterized immediately after the incision in order to prevent reattachment of the severed sides. A second way that is promoted in fanzine publications and on internet websites is a do-it-yourself-approach. Since people who are interested in splitting their tongue usually already have a tongue piercing, it is possible to thread a sharp wire (such as a fishing line) through the piercing hole and slowly (over the process of several days or weeks) perform the midline incision. However, since this process is relatively lengthy, re-attachment of the severed sides during wound healing is a common "problem". The risks for inflammation and other complications are considerable and potentially grave.

There are two reasons why tongue splits are interesting for speech-language pathologists. Firstly, it is important to gain knowledge about possible adverse effects of tongue splitting operations on speech and tongue movement since body modifications are increasingly becoming a mainstream pastime. In particular, dentists, oral surgeons and speech-language pathologists need to know if there is a new group of clients in the making. Secondly, tongue splits are an interesting case of speech perturbation. What are the effects of a lingual split on tongue movement and speech production and how do the speakers compensate for the structural alterations? The current study set out to gather preliminary data on speech and tongue motility in a speaker with a split tongue.

Materials and methods

Participant

One male participant with a cosmetic tongue split took part in this study. The participant was 33-years-old at the time of the examination and worked as a self-employed body artist. He had no formal medical training and only rudimentary knowledge about tongue anatomy and physiology. The participant had performed the tongue split procedure on himself 2 years previous to the interview in his home during a social get-together. The operation had been performed under a light topical anaesthetic with a surgical scalpel. He had cut his tongue blade along the lingual midline and cauterized the wound with a red-hot steel bead. The participant reported that the wound healing and swelling had been uncomplicated. He had only noted speech problems during the acute healing phase.

Speech recordings and perceptual evaluations

The participant underwent an articulation screening with the Fisher-Logemann articulation test (Fisher & Logemann, 1971). His spontaneous speech during an interview about his tongue split was recorded to VHS video with a Panasonic AG 180 video camera (Panasonic Canada Inc., 5770 Ambler Drive, Mississauga, ON L4W 2T3, Canada). Sound was recorded with the built-in directional microphone of the video camera. The interview was conducted in a quiet office environment.

Four speech-language pathologists, all of them with over 10 years of professional experience with pathological speech, reviewed a 30-second sample of the participant's speech. None of the listeners were involved in the study or familiar with the participant.

The listeners assessed their impression of the participant's speech intelligibility ("intelligibility impression") and the participant's speech acceptability as a percentage (i.e., 0% corresponded to the judgement "completely unacceptable"; 100% corresponded to the judgement "completely acceptable"). They also commented on specific articulatory distortions.

Tongue motility assessment

The participant was asked to demonstrate the motion range of his tongue with regards to protrusion, elevation and lateralization. The motion range of the tongue was documented on video.

Ultrasound imaging

In order to visualize the split tongue during speech sound production, three-dimensional ultrasound scans were made while the participant sustained the sounds /ʃ/, /s/, /ɹ/, /l/, /n/ and /ŋ/. The ultrasound scans were made with a General Electrics Logiq α100 MP ultrasound machine using a 6.5 MHz endocavity ultrasound transducer E72 (General Electric Medical Systems, PO Box 414, Milwaukee, WI53201, USA) and the 3D-Echotech Freescan software (3D Echotec GmbH, 85399 Halbergmoos, Germany). A detailed description of the set-up can be found in Bressmann, Uy, and Irish (2005).

Results

Perceptual evaluations

No articulatory distortions were noted during the Fisher-Logemann articulation test. The mean of the four intelligibility impression ratings was 99.25% (SD=1.5). The mean of the four ratings of speech acceptability was 96.25% (SD=4.79). Two of the raters perceived slight distortions of the sibilants /s/ and /z/.

Tongue motility assessment

In the tongue motility assessment, the participant demonstrated a sufficient lingual movement range. The blade of the tongue appeared slightly shortened. This was especially visible during lingual elevation towards the prolabium. On protrusion and elevation of the tongue, the cleft between the two sides of the split tongue blade widened. However, the participant was not able to demonstrate true antagonistic movement of the two sides of the tongue. On tongue protrusion and lateralization, he experienced significant shooting pains in the left side of the tongue.

Ultrasound imaging

The ultrasound examination demonstrated that the synergy of the two sides of the tongue was unaltered. The midline scar could be visualized during retraction of the tongue tip (Figure 2). During alveolar consonants, the anterior tongue dorsum and the visible part of the tongue blade showed a higher arching than would usually be seen in normal speakers (Bressmann et al., 2005). The posterior genioglossus furrow of the participant was

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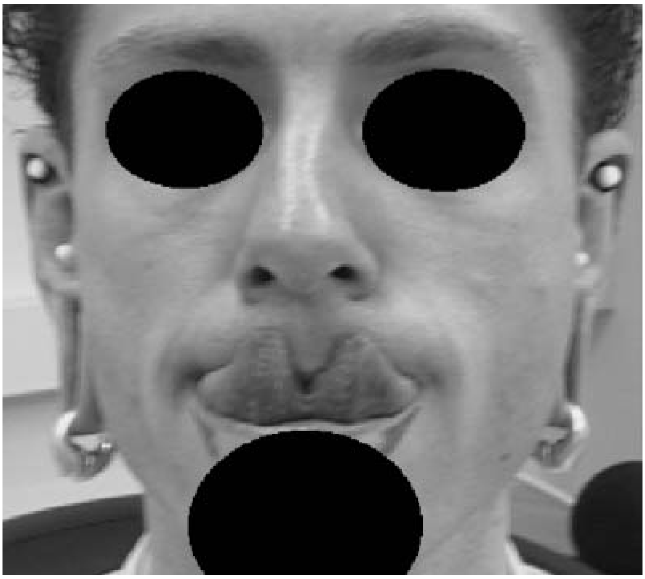

Figure 1. View of the tongue split during tongue protrusion.

particularly pronounced during the sustained production of /l/ and /n/ and appeared deeper than in normal speakers.

Discussion

Despite the considerable surgical alteration of the tongue, the participant's speech was remarkably unaffected. The ratings for the intelligibility impression and the speech acceptability were uniformly within a normal range. The participant's lingual motion range was equally well preserved. The two sides of the tongue moved in perfect synergy.

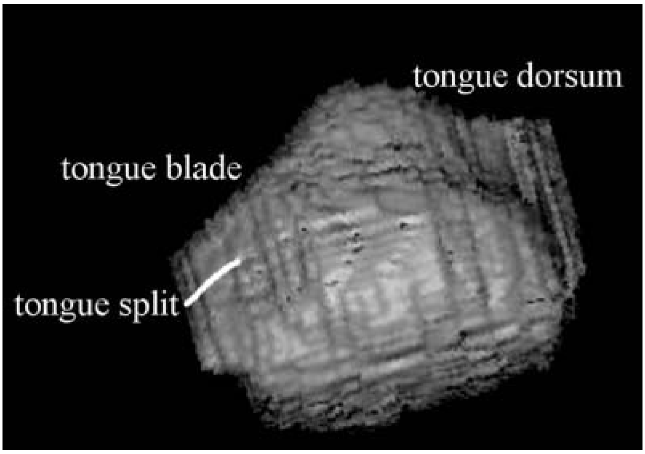

Figure 2. Three-dimensional ultrasound-scan of dorsal elevation of the tongue during sustained /ŋ/. The synergy of the two sides of the tongue is preserved. The midline split of the tongue blade can be visualized (indicated with a white line).

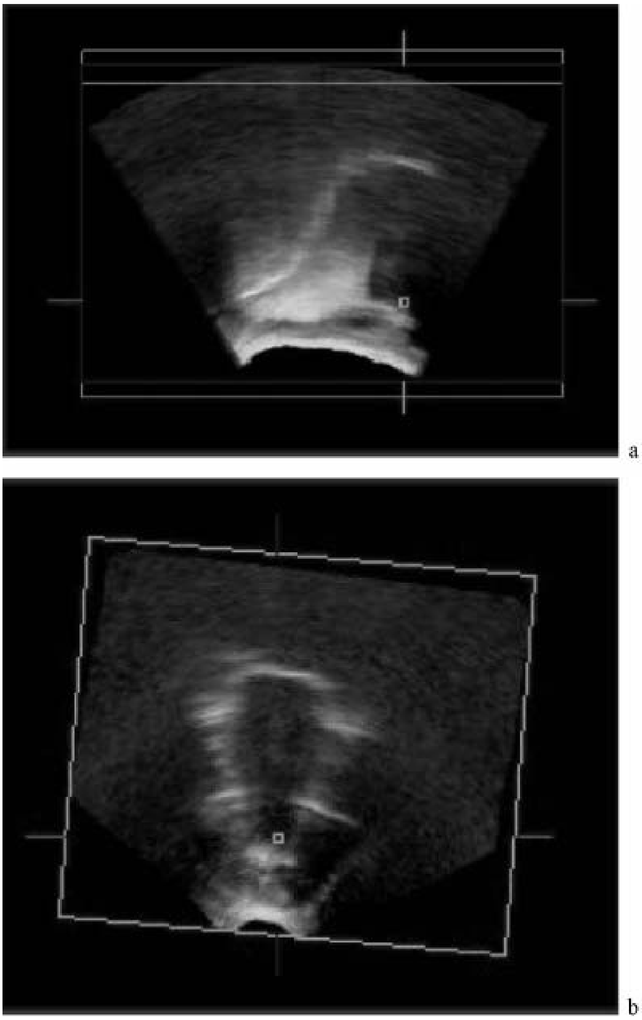

Figure 3. Different planes in a three-dimensional ultrasound volume of the participant's tongue during the production of sustained /ʃ/. (a) Midsagittal plane showing the marked protrusion of the posterior tongue. (b) Coronal plane in the anterior tongue blade. The increased medio-lateral compression is indicated by the high elevation of the tongue blade and the convex tongue surface.

The patient was not able to control the two separate tips of his tongue independently, much to his chagrin. During extreme protrusion or elevation of the tongue, the cleft between the two sides of the tongue widened. This is interpreted as a passive process. The participant commented that he had independent sensation in the two tips. He also commented on the novel sensation of being able to feel objects (such as rice or grains) in between the two sides of his tongue.

The three-dimensional ultrasound examination revealed how the patient was able to compensate for the tongue split. All three-dimensional scans showed a perfectly symmetrical tongue that looked quite normal. The midline split could be visualized as a thin line during retraction of the body of the tongue for the velar /ŋ/. It was noted that the participant's anterior tongue appeared very convex and elevated during the production of alveolar speech sounds. We interpreted this as a consequence of increased medio-lateral compression of the two sides of the tongue. The tongue motility assessment demonstrated how the two tips of the patient's tongue had a tendency to drift apart during extreme protrusion and elevation. The protrusion and elevation of the tongue that is needed for the production of alveolar speech sounds is not as extreme. However, since the two tips of the tongue had a tendency to slide apart, the participant now required increased compression of the two sides of the tongue in order to stabilize the tongue blade and tip. This interpretation is also in accordance with the observation of the notably deep posterior genioglossus furrow.

In conclusion, tongue surgery has significant risks for inflammation, dehiscence, infection and injury to supplying nerves or arteries. It should only be performed for urgent medical reasons such as oral cancer or obstructive macroglossia. It is certainly not to be recommended for cosmetic reasons, particularly, when it is done in a "do-it-yourself" fashion. Apart form the significant medical risks, the participant in this case study presented with surprisingly good functional outcomes for speech and tongue motility.

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